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This is a communication from the examiner in charge of your application.
COMMISSIONER OF PATENTS AND TRADEMARKS

☒ This application has been examined ☒ Responsive to communication filed on 1/10/97 ☒ This action is made final.

A shortened statutory period for response to this action is set to expire Three (3) month(s), 0 days from the date of this letter.
Failure to respond within the period for response will cause the application to become abandoned. 35 U.S.C. 133

Part I THE FOLLOWING ATTACHMENT(S) ARE PART OF THIS ACTION:

- | | |
|---|---|
| 1. <input type="checkbox"/> Notice of References Cited by Examiner, PTO-892. | 2. <input type="checkbox"/> Notice of Draftsman's Patent Drawing Review, PTO-948. |
| 3. <input type="checkbox"/> Notice of Art Cited by Applicant, PTO-1449. | 4. <input type="checkbox"/> Notice of Informal Patent Application, PTO-152. |
| 5. <input type="checkbox"/> Information on How to Effect Drawing Changes, PTO-1474. | 6. <input type="checkbox"/> |

Part II SUMMARY OF ACTION

1. ☒ Claims 45-84, 96, 181, 203-231 are pending in the application.
Of the above, claims _____ are withdrawn from consideration.
2. ☒ Claims 160-180, 182-202 have been cancelled.
3. ☐ Claims _____ are allowed.
4. ☒ Claims 45-84, 96, 181, 203-231 are rejected.
5. ☐ Claims _____ are objected to.
6. ☐ Claims _____ are subject to restriction or election requirement.
7. ☐ This application has been filed with informal drawings under 37 C.F.R. 1.85 which are acceptable for examination purposes.
8. ☐ Formal drawings are required in response to this Office action.
9. ☐ The corrected or substitute drawings have been received on _____. Under 37 C.F.R. 1.84 these drawings are ☐ acceptable; ☐ not acceptable (see explanation or Notice of Draftsman's Patent Drawing Review, PTO-948).
10. ☐ The proposed additional or substitute sheet(s) of drawings, filed on _____, has (have) been ☐ approved by the examiner; ☐ disapproved by the examiner (see explanation).
11. ☐ The proposed drawing correction, filed _____, has been ☐ approved; ☐ disapproved (see explanation).
12. ☐ Acknowledgement is made of the claim for priority under 35 U.S.C. 119. The certified copy has ☐ been received ☐ not been received ☐ been filed in parent application, serial no. _____; filed on _____.
13. ☐ Since this application appears to be in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under Ex parte Quayle, 1935 C.D. 11; 453 O.G. 213.
14. ☐ Other

EXAMINER'S ACTION

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As a review, it is noted that claims 45-84, 96, 181 and 203-231 remain in the case. Applicants have directed cancellation of claims 160-180 and 182-202. Yet Applicants have also directed "claim 201" to be amended. This direction has not been entered. Applicant may have intended claim 204, but it is not yet clear that this is the case. However, for completeness sake, claim 204 has been treated as if it were limited to elemental carbon. If this is not Applicants' intent, they are requested to indicate so.

Claims 45-84, 96, 181, and 203-231 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Each of the independent claims has been amended to replace "carbon source" with "elemental carbon". The claims are now unclear since the ungrammatical phrase "a elemental carbon" does not distinctly point out whether or not a mixture of elemental carbon types may be utilized.

In claim 181, it is unclear as to how much constitutes "amounts...capable of extracting and recovering... therefrom said allotrope in solid form". For example, if, arguendo, a microgram of C_{60} was an amount needed to qualify as solid C_{60} , would a process which produced a kilogram of soot which in toto contained microgram C_{60} (i.e., a parts-per billion concentration) be within

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the claims (since 1 microgram C_{60} is "capable" of being extracted and "capable" of yielding 1 microgram solid C_{60} ?) Does the claimed process depend upon what scale it is run, i.e., how much "sooty carbon product" is made or collected, or whether the process is batch or continuous? The lower limit as to the scope of the claimed "amounts" is indefinite because it is unclear how much of anything is the accepted value to be considered a "solid". Note that a solid particle of colloidal gold can be 1.7×10^{-7} cm in size. Is this the order of magnitude which Applicants intend?

In claim 83, lines 4-7, and in claim 84, lines 5-7, ^{and claim 222, it is} unclear as to what is the scope of "amounts (or quantities) (of C_{60}) sufficient to be capable of producing a... colored solution when extracted with sufficient (or effective) amounts of benzene". Would a metric ton of "sooty carbon product" containing a gram of C_{60} (i.e., a ppm C_{60} concentration) and extracted with a liter of solvent, be within the scope of the claims, (since quantities on the order of one gram C_{60} can impart color to solvent quantities on the order of one liter)? Note that the breadth of "extracted" does not preclude portionwise Soxhlet extraction of large quantities of "sooty carbon product" (e.g., metric ton) with small quantities of solvent (e.g., liter). What then is the lower limit of the scope of the claims as to amount of C_{60} ?

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Claims 45-82 and 96 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Note that there remains no descriptive support for the word "macroscopic" in the claims.

Claims 45-82 and 96 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for the preparation of a two-micron thick C_{60} coating, does not reasonably provide enablement for all macroscopic amounts of C_{60} . The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make the invention commensurate in scope with these claims. Note that.

the specification is not a commensurately enabling one, because the scope of the claims is broadened from the original disclosure, in that they now embraced formation and isolation of very large quantities of C_{60} (e.g., one ton), while the original disclosure's literal language only supports the production of $C_{60}/70$ quantities sufficient to produce coatings that are 2 microns thick. There is no disclosure supporting or describing larger quantities of C_{60} as are now embraced by the claims.

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With regards to the section 112 rejection, first paragraph, over the use of the word "macroscopic", Applicants argue there is support for this term which "permeates" the specification. Examples are given that the sample gave a color in benzene and that "macroscopic quantities had to be available to generate an X-ray diffraction of the product".

However, the description requirement involves the question of whether the claims "conform to" to disclosure of an application as filed. It is not merely that the word "macroscopic" does not appear in the specification which is the issue; an "in haec verba" support is not always necessary. There is no comparable language as broad in the application as filed as the instant limitation.

Rather, the use of "macroscopic" involves a departure from, or addition to, the disclosure as filed. Granted that there was a sample containing C_{60} which had its diffraction pattern measured. It is a clear departure from, or addition to, whatever quantity of C_{60} that was, to go to tonnage quantities of spectroscopically pure C_{60} , which is what "macroscopic" now implies.

Applicants separately argue that the specification is enabled for the claimed "macroscopic" amounts, in view of the prior Kroto Declaration and the position that "there is nothing

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in the law which requires the applicants to scale up the amount of products prepared by their process".

However, the specification gives no "guidance" as to how one would in fact go about scaling-up to collect "infinite amounts". Based upon only the application as filed and the state of the art, how would one know for sure that a building-sized graphite electrode would in fact work at all (quantity of experimentation necessary; unpredictability or predictability in the art). Yet Applicants state (at page 11, lines 19-21 of the last Response) that they intend to claim a "greater amount of carbon source". Also, the claims do not claim carrying out the methodology of instant Example 1 an infinite number of times to achieve a macroscopic amount; the claims appear to set forth one pass through a step of vaporizing elemental carbon.

Claims 45-84, 96, 181 and 203-331 of this application conflict with claims 57-63 and 68-87 of Application No. 08/486,669. 37 CFR 1.78(b) provides that when two or more applications filed by the same applicant contain conflicting claims, elimination of such claims from all but one application may be required in the absence of good and sufficient reason for their retention during pendency in more than one application. Applicant is required to either cancel the conflicting claims from all but one application or maintain a clear line of demarcation between the applications. See MPEP § 822.

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Applicants have stated that because the claims of the present case are "directed to a process of preparing C₆₀ and or C₇₀", while those of copending '669 are "directed to processes for preparing fullerenes", then there is a clear line of demarcation.

However, there has never been a determination that C₆₀ (a species) is patentably distinct from (albeit unsupported) claim verbiage to the genus of "fullerenes".

A "patentable distinction" constitutes one test for a "clear line of demarcation", according to MPEP 806.04(h). The requirement is continued since no such distinction has been convincingly argued.

The non-statutory double patenting rejection, whether of the obviousness-type or non-obviousness-type, is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent. *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); and *In re Goodman*, 29 USPQ2d 2010 (Fed. Cir. 1993).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(b) and (c) may be used to overcome an actual or provisional rejection based on a non-statutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.78(d).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 45-84, 96, 181 and 203-231^{are} provisionally rejected under the judicially created doctrine of obviousness-type double

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patenting as being unpatentable over claims 57-63 and 68-87 of copending Application No. 08/486,669. Although the conflicting claims are not identical, they are not patentably distinct from each other because the respective claims only differ in the functional recitation of how much C_{60} fullerene is made in the carbon vaporization process. However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have carried out the process of the instant claims in view of the claims of the copending '669 application, because said copending application is directed towards the same production and recovery of the same C_{60} fullerene as are the instant claims.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Applicants traverse the obviousness-type double patenting rejection by stating that the two applications are "not directed to the same patentable invention".

However the two applications are in fact directed to the same invention (albeit not patentable at this time). Given the instant C_{60} spherical carbon molecule as "prior art", the genus of fullerenes is not patentably distinct thereover since it embraces said molecule. Given the genus of "fullerenes" in the current claims of the copending application (although not

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supported in that application), such genus would suggest C₆₀ given the state of the art at the time the invention was made.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

Claims 45-54, 96, 181, 203-231 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kratschmer (article entitled "The Infrared...Spectra Of... Carbon Dust"), in view of Hamilton (US-3,094,428) and Kargin (Colloid Journal of USSR).

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The Kratschmer article substantially identically recites the C₆₀-fullerene production steps of the instant application. More particularly, this reference teaches producing carbon smoke particles by resistive heating of graphite rods in an inert He quenching gas having a pressure of 100 torr. The smoke was collected on substrates. Infrared and ultraviolet spectroscopy of the collected substance was consistent with a C₆₀ molecule of the soccerball structure. See entire document.

This article qualifies as prior art by virtue of section 102(a) of 35 USC , since it is technically a reference to "another", due to the presence of the Fostiropoulos co-author. Please see MPEP 2132.01, especially discussion therein to Ex Parte Kroger, 219 USPQ 370 (BPAI 1982).

This article does not appear to have "extracted" C₆₀ from the smoke particles.

Hamilton '428 teaches that it is known to disperse carbon black in benzene in order to form ink compositions or rubber compositions. See col. 1, lines 50-65.

Kargin teaches that carbon particles made from the condensation of carbon vapor in an argon atmosphere, can be deemed to be carbon black. A graphite anode and cathode were opposed to each other and a plasma was formed therebetween by passing current to the electrodes. A solid product was collected on a quartz tube. See page 258, 18-22 and page 256, lines 10-36.

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It would have been obvious to one having ordinary skill in the art at the time the invention was made to have dispersed the carbon smoke particles of the Kratschmer reference in benzene, thereby to have accomplished an extraction of C_{60} therefrom, because Hamilton teaches that it is known to disperse carbon black in benzene in order to form ink compositions or rubber compositions, and because Kargin would teach to the person of ordinary skill in the art to recognize Kratschmer's particles as being carbon black.

Please note that even those claims drawn to the recovery of "crystalline C_{60} ", such as claims 222, 213, and 230, do not specify a purity level, and thus embrace some non-zero quantity of "crystalline C_{60} " in admixture with C_{70} and even graphite and "fullerenic soot" (the bulk of the "sooty carbon product" of the instant claims). Thus, these claims continue to embrace the trace quantities of C_{60} which would naturally be brought about upon application of Hamilton's benzene to the carbon product of Kratschmer, as per the teaching of Kargin.

Applicants argue that the Office action is incorrect in assuming or suggesting that carbon black and C_{60} are the same.

On the contrary, the Kratschmer reference conclusively demonstrates that C_{60} is contained in the soot which was formed in that reference, and the Kargin reference is relied upon only to teach that such soot could also be characterized as a (very

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special sort of) carbon black, and thus suitable for Hamilton's process. Please note that the instant claims do not exclude dissolving C₆₀ in benzene in the presence of another solid substance, such as Hamilton's metal oxide.

Applicant's arguments filed 10 January 1997 have been fully considered but they are not persuasive. Note that each of Applicant's arguments which remain pertinent have been answered after the relevant rejection.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for response to this final action is set to expire THREE MONTHS from the date of this action. In the event a first response is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event will the statutory period for response expire later than SIX MONTHS from the date of this final action.

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This application is subject to the provisions of Public Law 103-465, effective June 8, 1995. Accordingly, since this application has been pending for at least two years as of June 8, 1995, taking into account any reference to an earlier filed application under 35 U.S.C. 120, 121 or 365(c), applicant, under 37 CFR 1.129(a), is entitled to have a first submission entered and considered on the merits if, prior to abandonment, the submission and the fee set forth in 37 CFR 1.17(r) are filed prior to the filing of an appeal brief under 37 CFR 1.192. Upon the timely filing of a first submission and the appropriate fee of \$385 for a small entity under 37 CFR 1.17(r), the finality of the previous Office action will be withdrawn. If a notice of appeal and the appeal fee set forth in 37 CFR 1.17(e) were filed prior to or with the payment of the fee set forth in 37 CFR 1.17(r), the payment of the fee set forth in 37 CFR 1.17(r) by applicant will be construed as a request to dismiss the appeal and to continue prosecution under 37 CFR 1.129(a). In view of 35 U.S.C. 132, no amendment considered as a result of payment of the fee set forth in 37 CFR 1.17(r) may introduce new matter into the disclosure of the application.

If applicant has filed multiple proposed amendments which, when entered, would conflict with one another, specific instructions for entry or non-entry of each such amendment should be provided upon payment of any fee under 37 CFR 1.17(r).

Any inquiry concerning this communication should be directed to Peter DiMauro at telephone number (703) 308-0680.

PD

P. DiMauro:vr

04-16-97

Michael Lewis

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